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168, are given up to the discussion of various ideas for making the reading of the essays more profitable; for this purpose, in three of these chapters, the general plan has been to make extracts from about fifty other of the competing essays, the extracts being connected by editorial comment. For example, in the chapter on "The special theory of relativity" there are extracts from competing essays of twenty-six authors, interlarded with more than twenty-five editorial comments. The following is the complete table of contents:

Preface, iii-xii; Chapter I: The Einstein \$5,000 prize: how the contest came to be held, and some of the details of its conduct, by the editor, 1-18; II: The world—and us: an introductory discussion of the philosophy of relativity, and of the mechanism of our contact with time and space, by various contributors and the editor, 19-46; III: The relativity of uniform motion: classical ideas on the subject; the ether and the apparent possibility of absolute motion; the Michelson-Morley experiment and the final negation of this possibility, by various contributors and the editor, 47-75; IV: The special theory of relativity: what Einstein's study of uniform motion tells us about time and space and the nature of the external reality, by various contributors and the editor, 76-110; V: The parallel postulate: modern geometric methods; the dividing line between Euclidean and non-euclidean; and the significance of the latter, by the editor, 111-140; VI: The space-time continuum: Minkowski's world of events, and the way in which it fits into Einstein's structure, by the editor and a few contributors, 141-168; VII: Relativity: the winning essay in the contest for the Eugene Higgins \$5,000 prize, by LYNDON BOLTON, British Patent Office, London, 169-180; VIII: The new concepts of time and space: the essay in behalf of which the greatest number of dissenting opinions have been recorded, by MONTGOMERY FRANCIS, New York, 181-194; IX: The principle of relativity: a statement of what it is all about, in ideas of one syllable, by HUGH ELLIOT, Chislehurst, Kent, England, 195-205; X: Space, time and gravitation: an outline of Einstein's theory of general relativity, by W. DE SITTER, University of Leyden, 206-217; XI: The principle of general relativity: how Einstein, to a degree never before equalled, isolates the external reality from the observer's contribution, by E. T. BELL, University of Washington, 218-229; XII: Force vs. geometry: how Einstein has substituted the second for the first in connection with the cause of gravitation, by SAUL DUSHMAN, Schenectady, 230-239; XIII: An introduction to relativity: a treatment in which the mathematical connections of Einstein's work are brought out more strongly and more successfully than usual in a popular explanation, by HAROLD T. DAVIS, University of Wisconsin, 240-250; XIV: New concepts for old: what the world looks like after Einstein has had his way with it, by JOHN G. MCHARDY, Commander R. N., London, 251-264; XV: The new world: a universe in which geometry takes the place of physics, and curvature that of force, by GEORGE FREDERICK HEMENS, M.C., B.Sc., London, 265-275; XVI: The quest of the absolute: modern developments in theoretical physics, and the climax supplied by Einstein, by Dr. FRANCIS D. MURNAGHAN [1921, 269], Johns Hopkins University, Baltimore, 276-286; XVII: The physical side of relativity: the immediate contacts between Einstein's theories and current physics and astronomy, by Professor WILLIAM H. PICKERING, Harvard College Observatory, Mandeville, Jamaica, 287-305; XVIII: The practical significance of relativity: the best discussion of the special theory among all the competing essays, by Prof. HENRY NORRIS RUSSELL, Princeton University, 306-317; XIX: Einstein's theory of relativity: a simple explanation of his postulates and their consequences, by T. ROYDS, Kodaikanal Observatory, India, 318-326; XX: Einstein's theory of gravitation: the discussion of the general theory and its most important application, from the essay by Prof. W. F. G. SWANN, University of Minnesota, Minneapolis, 327-333; XXI: The equivalence hypothesis: the discussion of this, with its difficulties and the manner in which Einstein has resolved them, from the Essay by Prof. E. N. DA C. ANDRADE, Ordnance College, Woolwich, England, 334-337; XXII: The general theory: fragments of particular merit on this phase of the subject, by various contributors, 338-345.

An Introduction to Mathematical Analysis. By F. L. GRIFFIN. Boston, Houghton, Mifflin Company, 1921. 12mo. 8 + 512 pp. Price \$2.75.

Extracts from the Preface: "Under the traditional plan of studying trigonometry, college algebra, analytic geometry, and calculus separately, a student can form no conception of the character and possibilities of modern mathematics, nor of the relations of its several branches as parts of a unified whole, until he has taken several successive courses. Nor can he, early enough,

get the elementary working knowledge of mathematical analysis, *including integral calculus*, which is rapidly becoming indispensable for students of the natural and social sciences. Moreover, he must deal with complicated technique in each introductory course; and must study many topics apart from their uses in other subjects, thus missing their full significance and gaining little facility in drawing upon one subject for help in another.

"To avoid these disadvantages of the separate-subject plan the unified course presented here has been evolved. This enables even those students who can take only one semester's work to get some idea of differential and integral calculus, trigonometry, and logarithms. And specialist students, as experience has shown, acquire an excellent command of mathematical tools by first getting a bird's-eye view of the field, and then proceeding to perfect their technique.

"A regular course in calculus, following this, can proceed more rapidly than usual, include more advanced topics, and give a fine grasp: the principles and processes have become an old story. And the regular course in analytic geometry can be devoted to a genuine study of the geometrical properties of loci, since most of the type equations, basic formulas, and calculus methods are already familiar.

"The materials presented here have been thoroughly tried out with the freshman classes in Reed College during the past nine years. Problems and methods which have proved unsatisfactory have been eliminated. Care has been taken to make the concepts tangible, relate them to the familiar ideas of daily life, exhibit practical applications, and develop the attitude of investigation. . . .

"The course as given at Reed College takes four hours a week through the year, the number of lessons devoted to the several chapters, when taken complete, having run about as follows: 14, 4, 14, 8, 11, 12, 11, 16, 5, 7, 10, 6, 6, 5, 4. . . . The course is adapted to students of widely differing preparations. A knowledge of plane and solid geometry and of algebra through quadratics is the most suitable equipment; but a number of students who had had only two years of secondary mathematics have carried the course very well. On the other hand, students who have already taken trigonometry and college algebra find in the present course very little that merely duplicates their former work."

Contents—A preliminary word to students, 1-2; Chapter I: Functions and graphs (Some fundamental problems of variation: rates, mean values, extremes, zero values, formulas, etc.), 3-57; II: Some basic ideas analyzed (Instantaneous rates, tangents, areas, etc., as limits), 58-75; III: Differentiation (Derivatives of polynomials and u^n . Rates, extremes, etc.), 76-125; IV: Integration ($\int x^n dx$. Area, volume, momentum, work, fluid pressure, falling bodies, etc.), 126-155; V: Trigonometric functions (Solution of right and oblique triangles. Applications), 156-188; VI: Logarithms (Numerical calculations. Compound interest. Triangles), 189-235; VII: Logarithmic and exponential functions, 236-270; VIII: Rectangular coordinates (Mapping. Motion. *Analytic geometry*: line, circle, parabola, ellipse, hyperbola; translation, intersections), 271-325; IX: Solution of equations (Quadratics: $b^2 - 4ac$. Rational roots of higher equations. Horner's and Newton's methods), 326-342; X: Polar coordinates and trigonometric functions (Definitions. Radians. Periodic variations. Derivatives), 343-367; XI: Trigonometric analysis (Basic identities. Equations. More calculus. Involute. Cycloid. *S.H.M.* Damped oscillations. Addition formulas. Sums and products, etc.), 368-391; XII: Definite integrals (Summation of "elements": length, surface of revolution, etc. Plotting a surface. Double integration. Partial derivatives. Simpson's rule), 392-414; XIII: Progressions and series (*A.P.* and *G.P.* Investment theory. Maclaurin series. Calculation of functions. Binomial theorem), 415-439; XIV: Permutations, combinations and probability ($P_{n,r}$; $C_{n,r}$. Chancel Normal probability curve. Least squares), 440-459; XV: Complex number system (Definition. Geometric representation. Operations. Roots of unity. Application), 460-472; Retrospect and prospect, 472-483; Appendix (Proofs for reference. Formulas. Integrals. Numerical tables: roots, natural and common logarithms, trigonometric functions for radians or degrees), 485-508; Index, 509-512.

Analytic Geometry with Introductory Chapter on the Calculus. By C. I. PALMER and W. C. KRATHWOHL. New York, McGraw-Hill Book Co., 1921. 12mo. 14 + 347 pages. Price \$2.50.

Preface: "The object of this book is to present analytic geometry to the student in as natural and simple a manner as possible without losing mathematical rigor. The average student thinks visually instead of abstractly, and it is for the average student that this work has been written.